

Microfluidic Paper-Based Devices for the Detection of Nitrate and Nitrite

Amer Charbaji¹, Teresa Mako², Winfield Smith¹, Cameron Coleman¹, Constantine Anagnostopoulos¹, Mohammad Faghri¹ & Mindy Levine²

¹Mechanical, Industrial & Systems Engineering, University of Rhode Island, Kingston, RI

²Chemistry, University of Rhode Island, Kingston, RI

Interest in microfluidic paper-based devices for environmental monitoring and analysis has increased over the past several years due to the many advantages that these devices exhibit as compared to conventional analytical methods in use. Microfluidic paper-based devices allow for low-cost, easy-to-use, rapid and in-field detection of nutrients in water that would increase the frequency and geographic coverage of such environmental monitoring.

Of the several different nutrients of interest, detection of nitrate and nitrite has garnered much attention due to human health concerns and environmental problems resulting from the availability of excess amounts of these nutrients in water. Microfluidic paper-based devices make use of capillarity to flow fluids through paper without the need of a pump. This allows for a self-contained device that doesn't require any power source to operate. We present microfluidic paper-based devices that we are currently working on developing for the detection of nitrate and nitrite in the parts per billion range.